
**2000/01 ANNUAL
COMBINED SEWER OVERFLOW REPORT**

King County Department of Natural Resources
Wastewater Treatment Division

October 2001



KING COUNTY
Wastewater Treatment Division

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Section 1 - Overview and Status of CSO Control Program

1.1 Introduction

This report is prepared and submitted to the Department of Ecology (Ecology) in accordance with the requirements established within the West Point NPDES Permit, No. WA-002918-1 and in WAC 173-245-090. As outlined in the WAC, this report includes:

- ◆ An overview and status of King County Department of Natural Resources, Wastewater Treatment Division's (WTD's) CSO Control Program
- ◆ 2000/01 CSO overflow volume and frequency information
- ◆ This report includes the formal submission of the annual reports for the Alki (App.1) and Carkeek (App.2) CSO treatment plants

1.2 Background

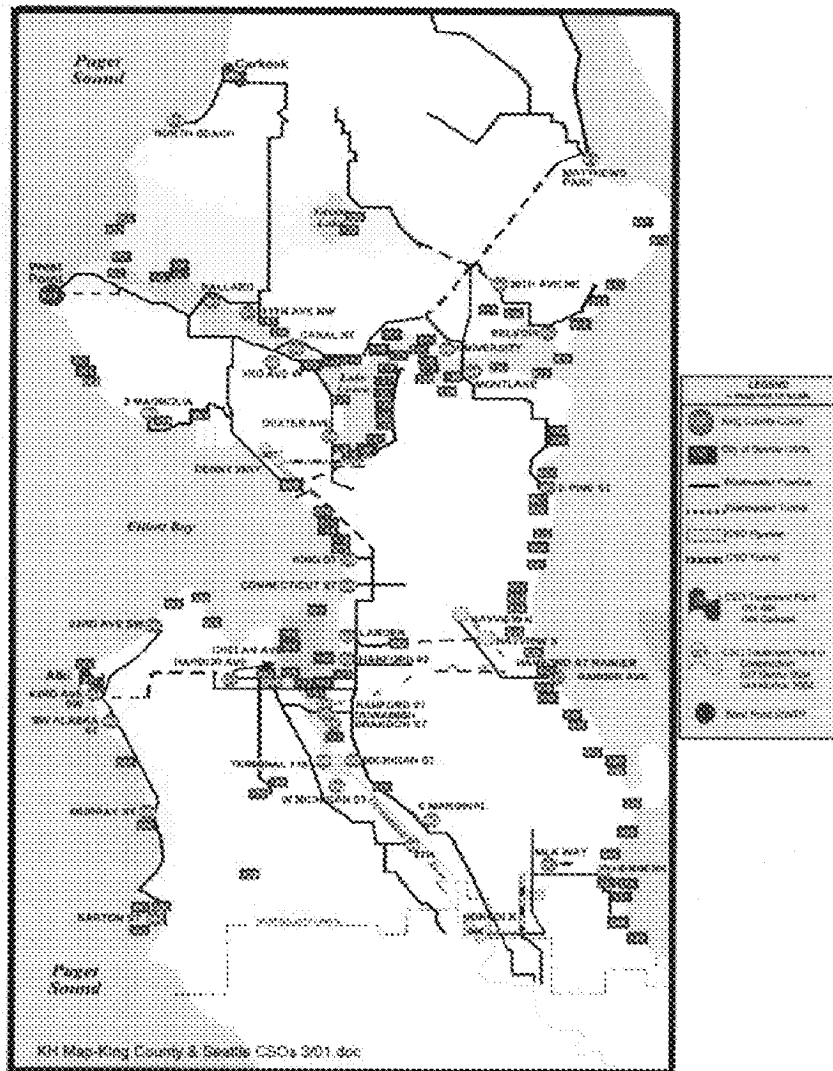
King County Wastewater Treatment Division (WTD) provides wholesale wastewater conveyance and treatment for flows from the City of Seattle and thirty-four other cities and sewer districts. The City of Seattle collection system contains combined sewers that collect both sanitary sewage and stormwater. Seattle's wastewater collection system conveys flow to County trunks and interceptors, which then convey flows to the County's West Point treatment plant located in Discovery Park. When large storm events occur, flows may exceed the capacity of the collection system pipes, resulting in combined sewer overflows (CSOs) into Lake Washington, Lake Union, the Ship Canal, the Duwamish River, and Elliott Bay and Puget Sound (Figure 1-1). CSOs are a recognized source of water pollution that can result in aesthetic degradation of shorelines during CSO events and may adversely affect sediment quality at discharge points. CSOs may raise public health concerns in areas where there is potential for public contact. King County has 37 CSO locations and Seattle has 113 (Figure 1.1). This Annual Report focuses solely on King County CSOs.

Since the 1960s, King County has been conducting overflow control projects to improve water quality in the Seattle-King County area. The County first formalized its CSO control program with the development of its *1979 CSO Control Program (1979 Program)*. The *1979 Program* identified nine projects to control CSO events into fresh water areas (Lake Washington, Lake Union, and the Ship Canal).

In 1985, new requirements were introduced with the Washington State Water Pollution Control Act (RCW 90.48) requiring all municipalities with CSOs to develop plans for "...the greatest reasonable reduction at the earliest possible date." The County's *1986 Plan for Secondary Treatment Facilities and Combined Sewer Overflow Control (1986 Plan)* met this state requirement.

Figure 1.1

King County & City of Seattle
Combined Sewer Overflows



Before the *1986 Plan* was implemented, new regulations were promulgated by Ecology. The new regulations (WAC 173-245-020) defined “greatest reasonable reduction” to mean, “control of each CSO such that an average of one untreated discharge may occur per year.” The County worked with Ecology to develop an interim goal of 75 percent reduction of CSO volumes system wide by the end of 2005. The County’s *Final 1988 Combined Sewer Overflow Control Plan (1988 Plan)* identified eleven CSO control projects designed to meet this interim goal. This interim goal was later withdrawn by Ecology, allowing the County to prioritize control projects for their protection of human health rather than volume reduction.

As part of the 1995 renewal process for the West Point Treatment Plant NPDES permit, King County prepared an update/amendment to the *1988 Plan*. The *1995 CSO Update* included an assessment of the effectiveness of CSO reduction efforts to date, a re-evaluation of priority for CSO sites, and a list of 3 projects for the next five years.

In November 1999, the *Regional Wastewater Services Plan (RWSP)* was approved by the King County Council. The *RWSP* outlines wastewater projects to be built over the next 30 years to protect human health and the environment, serve population growth, and meet regulatory requirements. The *RWSP* includes the County’s new CSO Control Plan, with twenty-one projects to control the County’s remaining uncontrolled CSOs to one untreated event per year on average at each CSO location.

An update of the *RWSP*’s CSO Control Plan - the *Year 2000 CSO Control Plan Update* – was included in the June 2000 submission of the West Point NPDES permit renewal application to Ecology. Besides being required by state regulations, the *Year 2000 CSO Control Plan Update* documents King County’s CSO control progress and compliance with state and federal CSO control requirements as of 2000, and commits to two very large control projects – Denny and Henderson/MLK/Norfolk - for the next five year NPDES permit cycle.

1.3 Status of CSO Control Projects

1.3.1 Completed CSO Control Projects

Tables 1-1 and 1-2 summarize CSO control projects completed to date by King County

Table 1-1 Completed CSO Control Projects

Project	Description	Completion	Status
Diagonal Separation	Determined to be a City of Seattle Project	Early 1990s	Complete per City of Seattle
Ft. Lawton Tunnel	Parallel tunnel to West Point providing greater transfer capacity	1991	Complete
CATAD	Computer control of flows to maximize storage in the pipelines	Phase 1 1992	Phase 1 completed; On-going maintenance and improvement
Hanford/Bayview/Lander Separation & Storage	Joint City/County partial separation of the Lander and Hanford basins, and reactivation of Bayview tunnel.	1992	Remaining control will occur under RWSP projects in 2017 (Hanford), 2019 (Lander) and 2026 (Hanford at Rainier). Lander stormwater mgmt on-going.
Carkeek Transfer/CSO Treatment	Flows up to 8.4 mgd from the Carkeek drainage basin are transferred to West Point. Flows above 8.4 mgd are treated at the Carkeek CSO Plant.	1994	The plant was found to receive more flow than anticipated. Predesign for the correction is near completion.
University Regulator/Densmore Drain	Separation of Densmore & I-5 stormwater, as well as Greenlake drainage.	1994	Remaining control will occur under a RWSP project in 2015. Densmore stormwater mgmt on-going.
Kingdome Industrial Area Storage & Separation	In 1994 a pipeline (used for storage) was laid in conjunction with Seattle and WashDOT street projects. In 1999, the Public Facilities District (PFD) completed 60% of the level 1 separation between Alaska Way and 3 rd Ave. in conjunction with stadium construction	1994, 1999	Remaining control will occur under a RWSP project in 2026.
Harbor Pipeline	A pipeline conveys overflow from the Harbor regulator to the West Seattle Tunnel for storage.	1996 (activated in 2000/01)	Operational 2000/01
Alki Transfer/CSO Treatment	Flows up to 18.9 mgd from the Alki drainage basin are transferred to West Point via the West Seattle Tunnel. Flows above 18.9 are treated at the Alki CSO plant.	1998	Additional CSO plant modifications were completed in 1999.
63 rd Ave. Pump Station	The over flows diverted to West Seattle Tunnel or Alki plant	1998	Close to 1/yr. - will monitor to check actual performance.

Table 1-2 Completed Associated Projects

Project	Description	Completion	Status
Renton Sludge Force Main Decommissioning	Sludge was pumped via the Elliott Bay Interceptor to West Point for processing until Renton developed solids management capability; decommissioning may have decreased solids discharge from Interbay Pump Station at Denny	1988	Complete
Denny Sediment Cap	Pilot sediment remediation project	1990	Remediation of remaining area of contamination is scheduled following overflow control
Allentown Diversion/Southern Transfer	Designed to offset addition of Alki flows to Elliott Bay Interceptor. Side-benefit of significant volume reduction at Norfolk	1995	Complete
CSO Monitoring Program: • NPDES Overflow & Sediments • Sediment Baseline	Initial characterization monitoring to identify project priorities; sediment characterization to identify clean up needs	1995, 1997	Complete
CSO Water Quality Assessment of the Duwamish River & Elliott Bay	Complex study to determine existing conditions and the relative contribution of CSO to pollution.	1999	Complete
Public Notification Program	A joint program between the City of Seattle, King County and the Seattle-King County Health Department to make the public aware of CSOs and their risks. It involves signage, information hotline, and brochures	1999	Implementation complete. Now on-going.
Norfolk Sediment Remediation (1)	Source Control, dredging and capping	1999	Follow-up monitoring underway

(1) This project was done under the Elliott Bay/Duwamish Restoration Panel (EBDRP) under the consent decree settling the 1990 litigation by National Oceanic and Atmospheric Administration (NOAA) against the City of Seattle and King County (then Metro) for natural resource damages attributed to CSOs and storm drains.

1.3.2 Current CSO Projects

In the *2000 CSO Plan Update*, two continuing projects for CSO control were identified, as constituting the County's control activities for the next NPDES permit cycle – approximately 5 years. They are:

- ◆ Denny/Lake Union CSO Project
- ◆ Henderson/Martin Luther King Jr. Way/Norfolk CSO Control Project

The Denny/Lake Union CSO project will reduce CSO discharges from approximately 50 untreated discharges per year on average to one untreated discharge per year on average. Denny will have approximately 14 treated discharges per year. This project is expected to be completed by late 2004. The Henderson/Martin Luther King Way/Norfolk project will reduce CSO at those three locations to one untreated discharge per year on average. Norfolk will also have approximately 4 treated discharges per year. Completion for this project is expected by late 2004.

While not a part of the CSO Control Plan, but associated, the Carkeek Overflow Reduction Study - to determine the causes of the CSO plant receiving too much flow, and to recommend the correction alternative - is nearing completion. Implementation of the correction will commence as soon as possible.

1.3.2.1 Denny Way CSO Control Project

The *1986 Plan* identified a storage and treatment approach to controlling Denny Way overflows. In the *1988 Plan*, the Denny Way project was changed to include partial separation of 584 acres in the Denny/Lake Union and Denny Local drainage basins. Predesign for the project was scheduled to begin in 1993 with construction ending in 1999.

In late 1991, the Seattle Public Utilities (formerly Seattle Drainage and Wastewater Utility) requested that King County participate in a joint analysis of CSO alternatives to control discharges into Lake Union from Seattle's system and into Elliott Bay from the County's system at the Denny Way regulator station. In 1992, a joint Denny Way/Lake Union CSO Control Project was submitted as a candidate for Federal Infrastructure Grant funds. During 1994, a specific City of Seattle/King County, Denny Way/Lake Union joint CSO Control project was developed, and a \$35 million Infrastructure Grant was awarded by the Environmental Protection Agency. The City completed construction of Phase 1 - a project to increase wet-weather capacity in the east and south Lake Union areas - in 1997. The City's Phase 2 project will connect their Phase 1 facilities to the County's Phase 3 and 4 facilities once they are completed.

Phase 3 (storage) and 4 (treatment) of the County's project were later combined. The Phase 3/4 project will control Lake Union and Denny Way CSOs by 1) storing CSO flows during small to moderate storms and transferring them to the West Point treatment plant after the storm subsides; and 2) providing on-site treatment at the Elliott West site with discharge of treated flows through a new outfall during heavy rain conditions. This will reduce untreated discharges from approximately 50/yr to 1/yr. Facilities include:

- ◆ a 6,200 ft. long and 14'8" diameter tunnel under Mercer Street between Dexter Avenue North and Elliott Avenue West (for CSO storage, primary clarification and conveyance)
- ◆ CSO control facilities at the Elliott West site (with floatable removal, disinfection, and dechlorination)
- ◆ piping and regulators to convey CSO flows from the existing County sewer system to the new facilities
- ◆ an outfall into Elliott Bay at Myrtle Edwards Park (to discharge treated flows from the Elliott West facilities)
- ◆ an extension of the existing outfall at the Denny regulator at Myrtle Edwards Park (to discharge untreated CSO flows, expected to occur about once per year)

A general milestone schedule for project implementation is shown below:

◆ Preliminary Design Began	Spring 1997
◆ Facilities Plan approved by Ecology	Fall 1998
◆ Final Design Began	Fall 1998
◆ Construction Begins	2000
◆ Construction Complete	2004

A joint final State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS)/National Environmental Policy Act (NEPA) Environmental Assessment for Phases 2 and 3/4 was issued in July 1998. Construction of the City and County project is underway and is scheduled to be completed by the end of 2004. Three railroad crossing tunnels were completed in April 2001, boring of the tunnel began in May 2001 and will continue through about July 2002 - 1400 ft has been completed as of August 2001. Construction of the marine outfalls began in July 2001 and will continue through February 2002.

1.3.2.2 Henderson/Martin Luther King Jr. Way/Norfolk CSO Control Project

At the time of adoption of the *1988 Plan*, the County believed that all CSOs into Lake Washington, including the discharge from the Henderson Street pump station and Martin Luther King Jr. Way overflow, had been controlled to the one event per year level. However, subsequent monitoring data indicated that overflows occurred more frequently than once per year at these locations.

As a result, in 1995 the County developed an engineering evaluation of the basin tributary to the Henderson/Martin Luther King Jr. Way CSOs to determine the sources and causes of the overflows at these locations, and identified interim and permanent corrective measures to control overflows. The evaluation also considered the impact of these measures on the downstream Norfolk regulator station. Based on this evaluation, the recommended alternative was to construct a 3.2-MG storage tank/CSO treatment facility near the Norfolk regulator station along with associated conveyance and pumping improvements.

During the 1997 predesign evaluation of alternatives, it was determined that a storage/treatment tunnel was more cost effective than the storage/treatment tank alternative. In addition, the storage tunnel had a conveyance system benefit, lower operation and maintenance, less adverse community impacts and was consistent with the approach being used on the Denny project. Therefore, the storage/treatment tunnel emerged from predesign as the preferred alternative. A 3,105 foot long and 14'8" diameter storage/treatment tunnel will be built to achieve the 1 untreated event per year level of control.

The Project elements and construction schedule are as follows:

Construction	<u>Begins</u>	<u>Ends</u>
• Henderson Pump Station	June 2001 Advertised for Bid	October 2003
• Tunnel and Pipelines	September 2001 Advertised for Bid	October 2004

1.3.2.3 Carkeek Overflow Reduction Study

This study is not part of the CSO Control Plan, but is associated. The Carkeek CSO Treatment Plant (on-line the end of 1994, but not really fully operational for another wet season) was found to be receiving more influent flow than had been identified and planned for, putting the County in violation of the NPDES permit limit of 14 MG/y of treated discharge. As we identified this problem an investigation was launched as a joint project with the City of Seattle (the local service provider in that area). The study found two things:

- Data used for the design of the Carkeek transfer and CSO plant was taken (mid-1980s) in what was, in retrospect, unusually dry years; and
- Unidentified overflows from the conveyance system (i.e. manholes) had been occurring and so were not accounted for in the measured loading to the plant. These flows have been captured as a result of system improvements and are now being transported to the Carkeek plant.

This means that the service area sends more flow than expected, and that the transfer to West Point was not designed to handle all of the area base flow. We have determined that up to 9.2 MGD is the appropriate base flow transfer rate ($2.25 \times \text{AWWF}$), and that the treated discharge will occur up to 10 times per year (5-year average), and will discharge a volume up to 46MGY (5-year average). The County will be requesting a change in the NPDES permit limits to reflect this correction to the original design. The County has completed an alternative analysis and is presently evaluating pump station performance improvements that may increase the transfer volume to be up to 9.2 MGD to West Point without increasing overflows to the Ship Canal. We expect to complete this by about November 2001 and then move toward implementation with the City of Seattle. Ecology Northwest Regional Office has been briefed several times in 1999-2000, and we plan to brief Ecology on the preferred alternative after the evaluation is complete.

1.3.3 Future RWSP Projects

Table 1-2 lists all the CSO projects that comprise the CSO element of the *RWSP*. The table includes a brief description of the facilities to be constructed, and a proposed completion date. King County reserves the option to modify this schedule.

RWSP CSO Control Projects**Table 1-3**

CSO Project	Project Description	Year Controlled
S. Magnolia	1.3 MG storage tank	2010
SW Alaska St.	0.7 MG storage tank	2010
Murray	0.8 MG storage	2010
Barton	Pump station upgrade	2011
North Beach	Storage tank and pump station upgrade	2011
Univ+Montlake	7.5 MG storage	2015
Hanford	3.3 MG storage/treatment tank	2017
West Point Improvements	Primary/secondary enhancements	2018
Lander	1.5 MG storage/treatment @ Hanford	2019
Michigan	2.2 MG storage/treatment tank	2022
Brandon	0.8 MG storage/treatment tank	2022
Chelan	4 MG storage tank	2024
Connecticut	2.1 MG storage/treatment tank	2026
King St.	Conveyance to Connecticut treatment	2026
Hanford@Rainier	0.6 MG storage tank	2026
8th Ave S	1.0 MG storage tank	2027
West Michigan	Conveyance upgrade	2027
Terminal 115	0.5 MG storage tank	2027
3rd Ave. W.	5.5 MG storage tank	2029
Ballard	1.0 MG storage tank (40% King County)	2029
11th Ave. West	2.0 MG storage tank	2030

1.3.4 On-going Program Elements

1.3.4.1 CATAD Modifications

The Computer Augmented Treatment and Disposal System (CATAD) controls the West Point treatment plant collection system. A control program for the CATAD system was developed and brought on line in 1992 to improve utilization of storage capacity in existing sewers. The control program included 3 components:

- 1) Raising storage levels behind regulator stations;
- 2) Lowering the wet well level at Interbay Pumping Station when rainfall was detected upstream, moving flow to West Point Treatment Plant sooner and vacating valuable storage space in the interceptor
- 3) Incorporating an optimization program (Predictive Control), which monitors rainfall and conditions in the major trunks and interceptors, predicts inflows to the sewer system, and optimizes the regulation of flow through the regulators to minimize CSOs.

These modifications to the system have been estimated to reduce CSO volumes by 150 MG per year, when all are operating as designed.

All three elements of the project were completed. However, problems at Interbay Pump Station and with the computer hardware at West Point now prevent the use of the second and third (Predictive Control) components (these controls remain available manually by the operators, though). Testing at the Interbay Pump Station is underway and will result in a new recommended operating scheme that will eliminate air entrainment in the pumps and ensure successful operation of the pump station during storm events. This improved operation should allow the CSO benefits of lower wet well operating levels (#2 above) to be achieved. Computer hardware and system software upgrades are being scheduled, which will enable operation of the "Predictive Control Program". Additionally, a global set point control scheme will be tested in 2002 to determine if the benefits of Predictive Control can be achieved with a simpler program, which would be easier to keep operational.

Modifications to the Predictive Control program are continually needed to incorporate new flow transfer and storage projects and to improve the efficiency and robustness of the optimization program.

1.3.4.2 Lander and Densmore Stormwater Management Program

As a result of County sewer separation projects creating stormwater-only discharges, King County and the City of Seattle now jointly conduct a stormwater management program in the Lander and Densmore drainage basins under the NPDES municipal stormwater permit. This is an on-going program that includes the following elements: source control, baseline sampling of stormwater discharges, and inspections. The maintenance of the stormwater system, the development of compliance schedules and enforcement actions are to be managed by the City of Seattle as specified in an interlocal agreement by and between the City of Seattle and King County.

1.3.4.3 CSO Notification Program

In order to meet state and federal requirements for public notification and to provide information to the community regarding the possible health impacts of CSOs, King County Department of Natural Resources (KCDNR), the Seattle-King County Health Department (SKCHD) and the City of Seattle Public Utilities (SPU) have collaborated on the development of a CSO Public Notification/Posting Program. Ecology was briefed on the program and accepted its development and components. This program includes posting warning signs at King County and City of Seattle CSOs, an information phone number for the public to contact the Seattle-King County Health Department (SKCHD) on questions concerning CSOs, a brochure, website, and other outreach efforts.

The CSO signs include a graphic, some text, the SKCHD information phone number, as well as a CSO number assigned to each site, which corresponds to its NPDES discharge serial number. Inspection of these signs is underway, with repairs ordered where vandalism or damage has occurred.

Due to the low volume of calls to the CSO Notification Information line to date, King County, City of Seattle, and the Seattle-King County Department of Health have decided to employ a message recorder that will be checked routinely.

Section 2 – 2000/01 CSO Volume and Frequency Summary

2.1 Introduction

The County's CATAD System monitors the volume and frequency of CSOs at regulator and pump stations in the West Point treatment plant system. Figure 1-1 at the front of this report shows the location of existing King County and City of Seattle CSO discharges. The area south of the Ship Canal is referred to as the Southern Service Area, and the area north of the Ship Canal (including the Montlake and Dexter regulator stations) is referred to as the Northern Service Area. The County deploys portable flowmeters at the following eleven CSO locations not currently monitored by CATAD: 11th Ave. NW, 53rd Ave. SW, 63rd Ave PS, Alaska Street (SW), Barton PS, Henderson Street, Magnolia (South), Martin Luther King Jr. Way, Murray PS, North Beach PS, and Terminal 115 (not in place yet). As shown on Table 2-1, rainfall measured by County rain gauges at pump and regulator stations for the 2000/01 reporting period averaged less than 24 inches. This is 37% below the average rainfall of 37 inches per year and indicates a pattern of less intense storms and better system recovery periods.

Table 2-1
2000/01 Rainfall at Pump and Regulator Stations
(in inches)

Station	Jun-2000	Jul-2000	Aug-2000	Sep-2000	Oct-2000	Nov-2000	Dec-2000	Jan-2001	Feb-2001	Mar-2001	Apr-2001	May-2001	2000/01 Total
Ballard	0.86	0.6	0.36	0.8	2.58	2.64	2.42	3	2.34	2.28	2.16	0.94	20.98
Chelan Avenue	1.61	0.52	0.47	0.82	1.73	3.81	3.34	3.68	3.07	3.65	2.54	1.68	26.92
Denny Local	0.91	0.26	0.33	0.86	2.75	2.74	2.16	2.79	2.4	2.38	2.17	0.94	20.69
King Street	1.02	0.19	0.11	0.88	3.47	2.73	2.21	2.81	2.28	2.53	1.93	1.21	21.37
Marginal Way E	0.65	0.4	0.52	0.81	2.99	2.84	2.2	2.56	2.34	2.31	2.11	1.43	21.16
Matthews Park	1.25	0.3	0.42	1.62	3.44	3.57	2.64	3.31	2.53	3.06	2.77	1.2	26.11
Pine Street, E	1.05	0.57	0.33	1.09	3.62	2.83	2.57	2.96	2.64	2.58	2.33	1.31	23.88
Rainier Avenue	1.38	0.46	0.44	1.06	3.32	2.94	2.67	2.76	2.58	2.73	2.34	1.27	23.95
University	0.99	0.72	0.46	1.15	3.48	3.02	2.46	3.09	2.61	3.37	2.62	1.03	25.00
Average	1.08	0.45	0.38	1.01	3.04	3.01	2.52	3.00	2.53	2.77	2.33	1.22	23.34

2.2 2000/01 CSO Volumes

The total system overflow volume for 2000/01 was 132.6 million gallons (MG), compared to the 1981-83 baseline of 2,339 MG. Of this, 8.1 MG overflowed in the northern service area and 124.5 MG in the southern service area. The major reason for such a low volume of CSO is the abnormally dry year, with rainfall 37% below normal levels. We expect volumes to increase upon return to a more normal rainfall.

2.2.1 2000/01 CSO Volume Control Progress

Table 2-2 contains the monthly overflow volumes and comparisons to baseline conditions for each station.

Table 2-2
2000/01 CSO Volume Summary
(in million gallons)

Station	DSN	Service Area	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	2000-01 Total (MG)	1983 Baseline (MG)
11 th Ave NW ¹	004	North	0.02	<0.01	<0.01	<0.01	0.86	0.16	<0.01	0.23	0	0.14	0.43	<0.01	1.8	5
30 th Ave. NE	049	North	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1
3rd Ave. W.	008	North	<0.01	<0.01	<0.01	<0.01	0.10	<0.01	<0.01	0.12	<0.01	<0.01	<0.01	0.03	0.3	106
53rd Ave. SW	052	Alki	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1
63rd Ave. PS ¹	054	Alki	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10
8th Ave./W. Marginal Way	040	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8
Alaska St. SW	055	Alki	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1
Ballard	003	North	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	95
Barton ¹	057	Alki	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8
Belvoir	012	North	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1
Brandon St.	041	South	0.76	<0.01	0.01	<0.01	4.71	1.64	1.14	3.32	0.17	0.35	0.76	1.89	14.8	64
Canal St.	007	North	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1
Chelan	036	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	61
Connecticut	029	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	90
Denny Way	027	South	6.86	<0.01	<0.01	<0.01	14.18	14.29	4.10	19.25	2.62	4.59	4.24	4.79	74.9	502
Dexter	009	North	0.24	<0.01	<0.01	<0.01	1.05	<0.01	<0.01	0.24	<0.01	<0.01	2.77	0.70	5.0	24
Duwamish P.S.	034	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1
Hanford	031/2	South	0.86	<0.01	<0.01	<0.01	3.03	1.43	1.02	3.30	<0.01	<0.01	<0.01	<0.01	9.64	644
Harbor Ave.	037	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	36
Henderson ¹	045	South	0.13	<0.01	<0.01	<0.01	0.81	0.48	0.32	0.44	0.01	0.02	0.29	0.33	2.8	15
King Street	028	South	0.49	<0.01	<0.01	<0.01	1.34	<0.01	0.70	1.30	<0.01	<0.01	0.08	0.47	4.4	55
Lander II St.	030	South	0.23	<0.01	<0.01	<0.01	0.60	4.91	0.11	0.30	<0.01	<0.01	<0.01	0.35	6.5	143
Magnolia, S ¹	006	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	14
Marginal E	043	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1
Matthews Park	018	North	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1

Table 2-2 continued																
Station	DSN	Service Area	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	2000-01 Total (MG)	1983 Baseline (MG)
Michigan	039	South	0.18	<0.01	<0.01	<0.01	1.36	<0.01	0.25	0.36	<0.01	0.01	<0.01	0.81	3.0	190
Michigan, W.	042	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2
MLK Jr. Way ¹	013	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	60
Montlake	014	North	0.23	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	32
Murray ¹	056	Alki	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6
Norfolk St.	044	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.23	<0.01	<0.01	<0.01	0.11	0.4	39
North Beach ¹	048	North	<0.01	<0.01	<0.01	<0.01	0.35	0.01	<0.01	0.17	0.04	0.17	<0.01	<0.01	0.7	6
Pine, E St.	011	North	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1
Rainier Ave.	033	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1
Terminal 115 ⁴	038	South	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2
University	015	North	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	126
TOTAL			10.6	0.0	0.0	0.0	30.4	24.3	8.5	32.6	2.8	5.3	8.6	9.5	132.6	2339
2000/01 Rainfall Average (historical average in inches)			1.08	0.45	0.38	1.01	3.04	3.01	2.52	3.00	2.53	2.77	2.33	1.22	23.3	37
CSO PLANTS:																
Alki Plant	051	Alki	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	108 ³
Carkeek Plant	046	North	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.11	<0.01	<0.01	0.11	14 ³

(1) Portable flow meters; not currently monitored by CATAD.

(2) Baseline for both CSO frequency and volumes have been revised since the 1988 final CSO Plan due to improvements made to the computer modeling system that provide more accurate projections on historical and future conditions

(3) NPDES Permit Limit

(4) Estimated by inspection. We have not been able to install a meter at this location.

Figures 2-1 graphically illustrates the relationship between rainfall and CSO volumes during this 2000/01 reporting period.

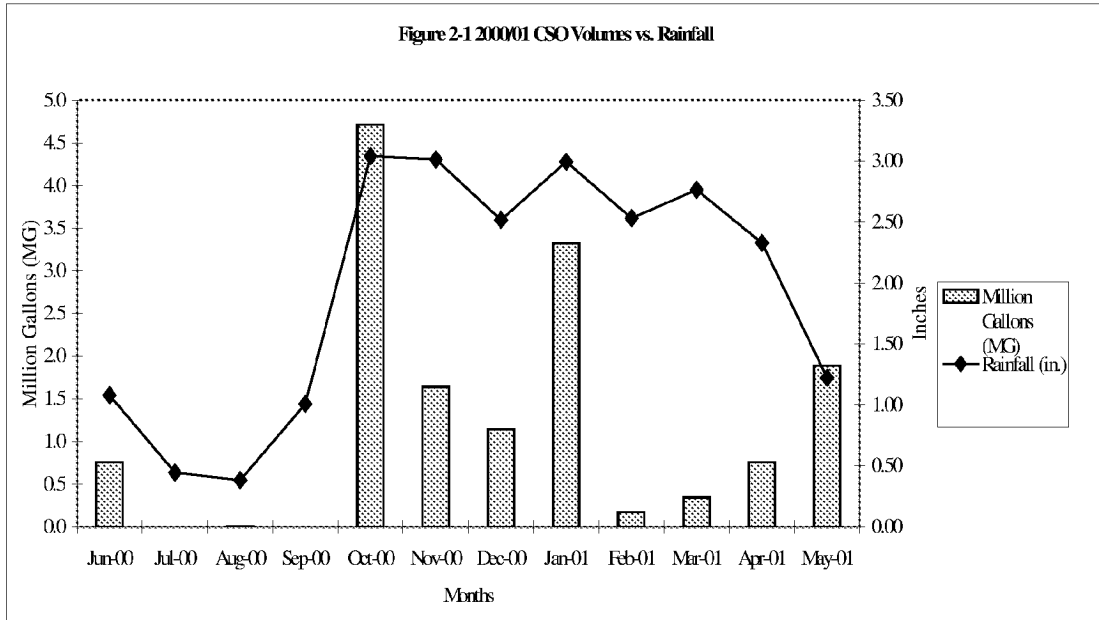
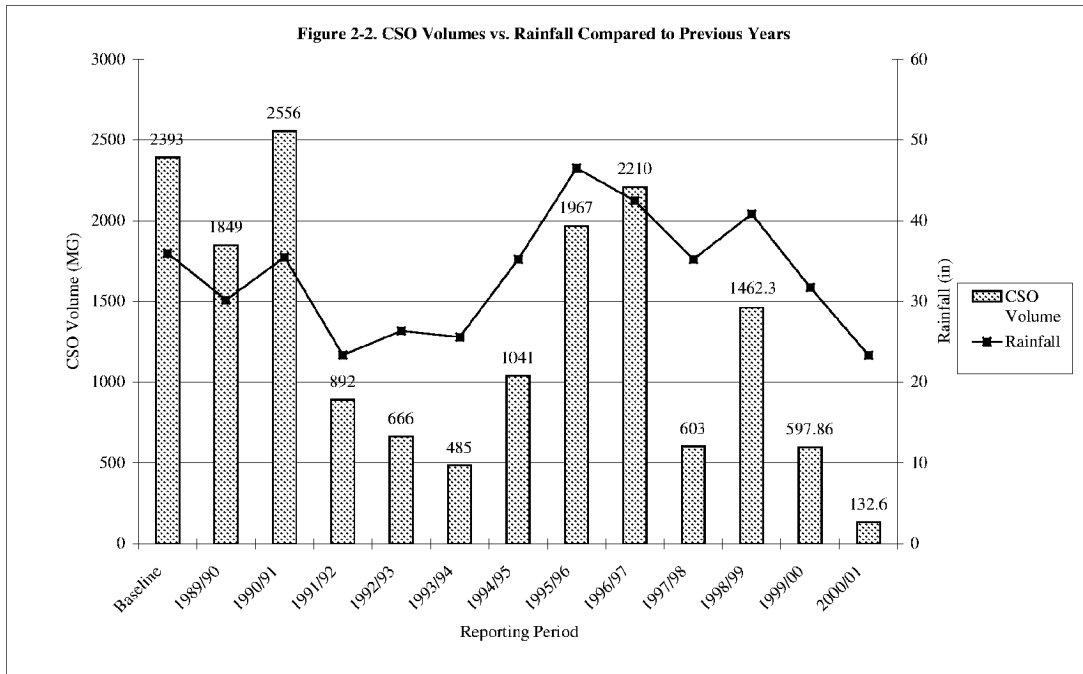


Figure 2-2 illustrates the progress King County has made in CSO volume control over time.



2.3 2000/01 CSO Event Frequency

131 overflow events occurred during 2000/01. This low number reflects a year of below average rainfall as well as the completion of CSO control projects.

When the County (then Metro) originally began CSO control planning we defined a CSO “event” as an overflow preceded and followed by 3 hours without overflow – 3 hours was the chosen “inter-event interval.” Over time we noticed that many small overflow events were occurring during a single rainstorm – suggesting that our inter-event interval definition was incorrect. Statistical assessment indicated that a 40 - hour interval achieved the one storm/one overflow goal, so the County made the switch formally to a 48-hour interval (rounded up for reporting convenience) in our *Year 2000 CSO Plan Update*, submitted with the West Point NPDES permit renewal in June 2000.

In 2000 & 2001 Ecology developed inter-event interval guidance requiring that a 24-hour interval be used. This is the first annual report using the new 24-hour inter-event definition. The baseline, however, has not yet been remodeled for the new 24-hour inter-event interval – this will be completed for the next annual report. We present the baseline here for the 48-hour inter-event interval as a rough estimate – that based on the 24-hour interval will be slightly higher. Due to the large modeling effort required, we will not recalculate past years’ frequency counts using this new definition, and so will have lost historical continuity with past data.

2.3.1 2000/01 CSO Event Frequency Control Progress

Table 2-3 contains the monthly frequencies and comparisons to baseline conditions for each station.

Table 2-3
2000/01 CSO Event Frequency Summary
(Based on 24-hour Inter-Event Interval – Baseline Calculated on 48 hr. Interval)

Station	DSN	Service Area	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	2000-01 Total (MG)	1983 Baseline (MG) 48 hr.
11 th Ave NW ¹	004	North	1	0	0	0	2	1	0	1	0	1	3	0	9	14
30 th Ave. NE	049	North	0	0	0	0	0	0	0	0	0	0	0	0	0	<1
3rd Ave. W.	008	North	0	0	0	0	1	0	0	1	0	0	0	1	3	15
53rd Ave. SW	052	Alki	0	0	0	0	0	0	0	0	0	0	0	0	0	<1
63rd Ave. PS ¹	054	Alki	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8th Ave./W. Marginal Way	040	South	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Alaska St., SW ¹	055	Alki	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ballard	003	North	0	0	0	0	0	0	0	0	0	0	0	0	0	13
Barton ¹	057	Alki	0	0	0	0	0	0	0	0	0	0	0	0	0	8

Table 2-3 continued																
Station	DSN	Service Area	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Total (Ev/yr)	Baseline (Ev/yr) 48 hr.
Belvoir	012	North	0	0	0	0	0	0	0	0	0	0	0	0	0	<1
Brandon St.	041	South	1	0	1	0	5	3	3	3	2	3	3	2	26	32
Canal St.	007	North	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Chelan	036	South	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Connecticut	029	South	0	0	0	0	0	0	0	0	0	0	0	0	0	23
Denny Way	027	South	1	0	0	0	5	2	1	2	2	4	3	1	21	25
Dexter	009	North	1	0	0	0	4	0	0	1	0	0	1	1	8	15
Duwamish P.S.	034	South	0	0	0	0	0	0	0	0	0	0	0	0	0	<1
Hanford	031/2	South	1	0	0	0	4	2	1	2	0	0	0	0	10	63
Harbor Ave.	037	South	0	0	0	0	0	0	0	0	0	0	0	0	0	26
Henderson ¹	045	South	0	0	0	0	4	2	1	3	2	3	4	1	20	11
King Street	028	South	1	0	0	0	2	0	1	2	0	0	1	1	8	14
Lander II St.	030	South	1	0	0	0	1	2	1	1	0	0	0	1	7	22
Magnolia, S ¹	006	South	0	0	0	0	0	0	0	0	0	0	0	0	0	21
Marginal E	043	South	0	0	0	0	0	0	0	0	0	0	0	0	0	<1
Matthews Park	018	North	0	0	0	0	0	0	0	0	0	0	0	0	0	<1
Michigan	039	South	1	0	0	0	2	0	1	1	0	1	0	1	7	32
Michigan, W.	042	South	0	0	0	0	0	0	0	0	0	0	0	0	0	5
MLK Jr. Way ¹	013	South	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Montlake	014	North	1	0	0	0	0	0	0	0	0	0	0	0	1	5
Murray ¹	056	Alki	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Norfolk St.	044	South	0	0	0	0	0	0	1	1	0	0	0	1	3	18
North Beach (1)	048	North	0	0	0	0	2	1	1	1	1	2	NM	NM	8	17
Pine, E St.	011	North	0	0	0	0	0	0	0	0	0	0	0	0	0	<1
Rainier Ave.	033	South	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Terminal 115 ⁴	038	South	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	3
University	015	North	0	0	0	0	0	0	0	0	0	0	0	0	0	12
TOTAL			9	0	1	0	32	13	11	19	7	14	15	10	131	431
2000/01 Rainfall Average (historical average in inches)			1.08	0.45	0.38	1.01	3.04	3.01	2.52	3.00	2.53	2.77	2.33	1.22	23.3	37
CSO PLANTS:																
Alki Plant	051	South	0	0	0	0	0	0	0	0	0	0	0	0	0	29 ³
Carkeek Plant	046	North	0	0	0	0	1	0	0	0	0	0	0	0	1	8 ³

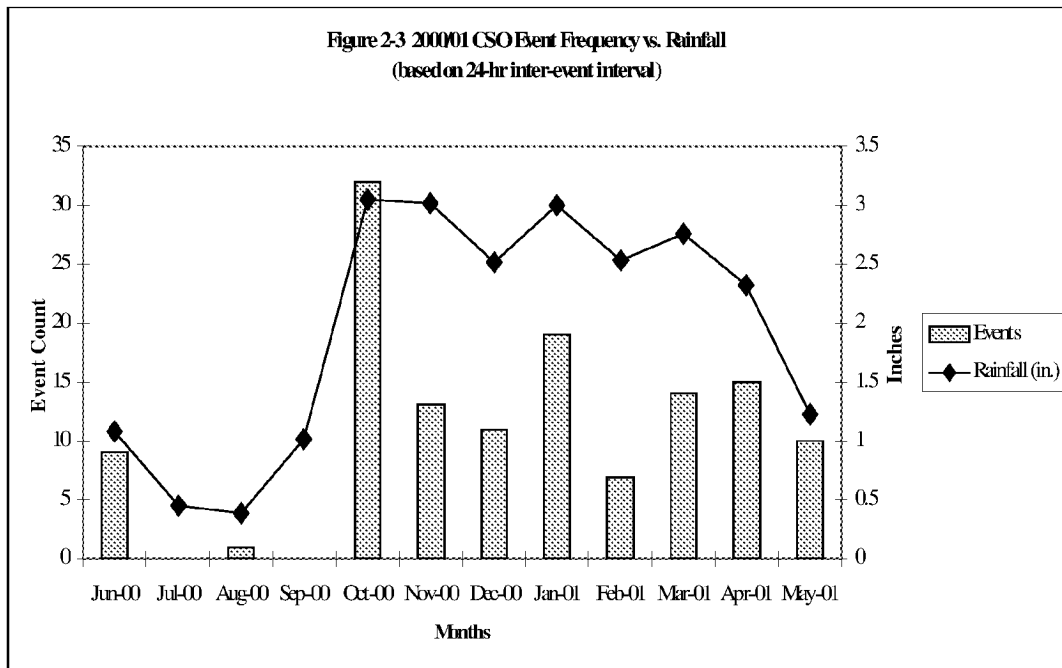
(1) Portable flow meters; NM indicates not currently monitored by CATAD or that a monitor failure occurred.

(2) Baseline for both CSO frequency and volumes have been revised since the 1988 final CSO Plan due to improvements made to the computer modeling system that provide more accurate projections of historical and future conditions

(3) NPDES Permit Limit

(4) Estimated by inspection. We have not been able to install a meter at this location.

Figure 2-3 graphically illustrates the relationship between rainfall and CSO frequency during this 2000/01 reporting period. No historical chart is presented due to changed inter-event interval from previous years.



2.4 CSO Treatment Plant Performance

King County currently operates two CSO treatment facilities, the Alki and Carkeek Park CSO treatment plants. These plants are part of systems that transfer base flows (2.25xAWWF –Average Wet Weather Flow), a small amount of stored flow, and solids removed during CSO treatment to the West Point Plant. Flows above the capacity of the transfer are sent through the CSO treatment plants where they receive primary treatment, disinfection and discharge to Puget Sound through a moderately deep outfall. Carkeek transfers up to 8.4MGD (it will transfer about 9.2MGD after corrections are made) to West Point and Alki transfers up to 19MGD. Two additional facilities - storage/treatment tunnels - are in final design for the Denny and the Henderson/MLK/Norfolk locations. They are expected to be on-line in 2004.

2.4.1 Alki CSO Plant

The Alki CSO treatment plant did not operate or discharge during the year due to the low rainfall. See Appendix 1 - the plant specific annual report - for more detail.

Alki benefited in the past from the temporary extra capacity in the West Seattle Tunnel – sending extra flow to the tunnel before the routing of Harbor CSO flows began. The Harbor flows now go to the tunnel. In future years, after the drought, it is expected that Alki will discharge more effluent – closer to the 108 MGY that was planned - and perhaps discharge more frequently (up to 29 per year on a 5 year average), than has been observed to date.

2.4.2 Carkeek Park CSO Plant

The Carkeek CSO treatment plant operated once and discharged 1 time for a total of 0.11 MG discharged during the year. The effluent met the daily and annual permit limits for settleable solids. The sampler for settleable solids failed to operate during the brief event, so no information is available. As the plant is allowed to drop one untreated/poorly treated event per year for calculating performance, this would not have caused a permit violation.

See Appendix 2 - the plant specific annual report - for more detail.

The Carkeek CSO Treatment was found to be receiving more influent flow than had been identified and planned for, putting the County in violation of the NPDES permit limit of 14 MG/y of treated discharge. As we identified this problem an investigation was launched as a joint project with the City of Seattle (the local service provider in that area). The study found two things:

- Data used for the design of the Carkeek transfer and CSO plant was taken (mid-1980s) in what was, in retrospect, unusually dry years; and
- Unidentified overflows from the conveyance system (i.e. manholes) had been occurring and so were not accounted for in the measured loading to the plant. These flows have been captured as a result of system improvements and are now being transported to the Carkeek plant.

This means that the service area sends more flow than expected, and that the transfer to West Point was not designed to handle all of the area base flow. We have determined that up to 9.2 MGD is the appropriate base flow transfer rate ($2.25 \times \text{AWWF}$), and that the treated discharge will occur up to 10 times per year (5-year average), and will discharge a volume up to 46MGY (5-year average). The County will be requesting a change in the NPDES permit limits to reflect this correction to the original design. The County has completed an alternative analysis and is presently evaluating pump station performance improvements that may increase the transfer volume to West Point without increasing overflows to the Ship Canal. We expect to complete this by about October 2001 and then move toward implementation with the City of Seattle. Ecology Northwest Regional Office has been briefed several times in 1999-2000, and we plan to brief Ecology on the preferred alternative after the evaluation is complete.

Appendix 1 - Alki CSO Plant Annual Report

This document is the second annual CSO report for the Alki CSO Treatment Plant, located in West Seattle. It summarizes Alki's performance and operation during the subject period.

Alki previously operated under NPDES permit WA-002901-7 as a primary treatment plant. Alki ceased operation as a primary facility on July 15, 1998. Though operated as a CSO treatment facility after October 1998, Alki was not incorporated into West Point's NPDES permit as a CSO treatment facility until Oct. 25, 1999 (WA-0029181-1). The annual reporting period for the Alki CSO facility is concurrent with the annual CSO reporting period: June 1- May 31.

Performance

There were no filling or discharge events from the Alki CSO facility in the June 2000 – May 2001 reporting year. The last event was in February 2000.

The lack of a discharge was due to the very dry winter that Seattle and the Pacific Northwest experienced in 2000-2001. Less than 24 inches of rain fell in the reporting year. This is about 13 inches less than the historical annual rainfall for the Seattle metropolitan region.

When rainfall returns to more normal levels, discharge events from Alki are expected to increase substantially. During the winter of 2000-2001, Harbor Ave. Regulator was activated to discharge storm flows into the West Seattle Tunnel. This will assure that Harbor Ave. Regulator discharges no more than one untreated CSO per year, but will contribute to increased treated discharges at Alki as anticipated and permitted for the original design.

The effluent limits for the Alki CSO facility are defined as follows:

- suspended solids (SS) are limited to a yearly average of events of 60 mg/l or less
- settleable solids (TSS) are limited to 1.9 or less ml/l/hr per event
- settleable solids (TSS) are limited to a yearly average of 0.3 or less ml/l/hr.
- number of events per year is limited to an average of 29 based on the 5-year permit cycle, and
- the discharge volume is limited to an average of 108 million gallons per year based on the 5-year permit cycle.

Operational Issues

There were no filling or discharge events at the Alki CSO facility in the June 2000 – May 2001 reporting year.

Maintenance and Construction Activities

The 1999-2000 Annual Report described the various efforts that were taken to modify the Alki CSO Plant, and thus make it more reliable and more effective. Over the 2000-2001 reporting period, additional adjustments and modifications were made to the facility for similar reasons, including making Alki a little more "user-friendly". Modifications this year primarily addressed the primary sedimentation tanks, the raw sludge pumps, the

hypochlorite disinfection system, sampling, facility clean-up/washdown, and the data acquisition and control systems.

New, structurally stronger, flights (longitudinal sludge collectors) were installed in all the primary clarifiers over the last year to address mechanical problems. In addition, energy dissipators were installed in the influent channel to reduce the velocity force into the tanks. These changes along with the current control system (which allows primary sedimentation tanks to be filled in different sequences depending on the magnitude of the flow) are intended to reduce the likelihood of mechanical failures in the future.

As soon as the primary sedimentation tanks are filled, raw sewage pumps begin to pump captured sludge to the West Seattle Tunnel. This past year, air bleed valves and a 3-way flushing valve were installed to reduce the problems previously encountered with the pumps losing their prime, and/or becoming airborne. Improvements were also made to the scum removal system, including replacement of the spray header valves.

Modifications continued to be made to the hypochlorite disinfection system in 2000-2001. Most of the work was performed to obtain better dosing control over a wide range of flows and intermittent flows, and to reduce the impacts of off-gassing (e.g., metering pumps losing their prime) and crystallization that occur with hypochlorite. Work performed included converting valves to chemical diaphragm valves, installation of water flushing connections for the metering pumps, modification of chemical batching controls to allow partial batches, and installation of air relief valves on the hypochlorite feed lines. An additional signal was added to the installed chart recorder to trend the signal from the residual analyzer. In addition, several leaks were repaired and pipe fittings replaced to reduce the potential for hypochlorite leaks.

The automated hypochlorite feed system allows for the addition of hypochlorite at Alki's influent and/or effluent. Hypochlorite is normally added to the plant influent. This allows for better control of the hypochlorite dose, and a lower effluent chlorine residual. Hypochlorite is stored and dosed as a 2 to 4% solution. This solution allows higher flow rates through the dosing pumps, which reduces the potential for overdosing and underdosing. A low concentration solution is also more stable.

Small modifications were made to the samplers and chlorine analyzers. Strainers/screens were installed on the sample pumps that serve these instruments to reduce clogging problems. Also, stainless steel chains were installed on the sample pumps to facilitate pump removal for maintenance. Influent and effluent samplers are programmed to take flow-paced samples.

Numerous changes were made throughout Alki to expedite draining and washdown of the tanks and facilities. Most notable of these changes was the installation of a sump and sump pump in the chlorine contact channel. This will facilitate draining the contact channel through the primaries and sludge removal system, and will reduce Alki discharge volumes during intermittent events. The addition of a suction bell to a recirculation pump will allow the contact channel tank to be pumped-down to a lower level. New process-water hydrants were installed at the chlorine contact channel and in the bar screen room, to accommodate clean-up efforts. Also, modifications were made to the scum removal spray systems which should reduce clean-up time.

Considerable work was also directed at improving the ability to locally and remotely monitor and control Alki. Operators can now remotely monitor most conditions at the Alki plant. Maintenance staff are working on some lingering problems with analog signals, and tying the Alki's remote data acquisition system into the main plant's distributed control system. This will facilitate remote operation of the facility.

Table A1-1 Alki Settleable Solids (SS) Performance

June 1, 2000 through May 31, 2001

Date	Effluent Event #	Settleable solids (mls/L/hr)	Event Maximum (ml/L/hr)	Event Average (ml/L/hr)	Comments
None	0	0	0	NA	
Annual Event Average				NA	

- NM means not measured; NA means calculation not available; N/A means not applicable

Table A1-2 Alki Total Suspended Solids (TSS) Performance

June 1, 2000 through May 31, 2001

Date	Inflow Event Number	Influent Flow (MG)	Influent TSS (mg/l)	Discharge Event Number	Effluent Flow (MG)	Effluent TSS (mg/l)	Discharge Event Effluent TSS (mg/L)	WPTP TSS removal (%)	Influent TSS lbs of solids	Alki TSS lbs discharged - outfall	Solids pumped to WPTP (TSS lbs)	Alki solids (lbs. TSS) treated out with WP effluent	Total Alki solids out (Alki+WP)	Alki CSO Treatment "System" TSS Removal (%)
None	0	0	0	0	0	0	0	N/A	0	0	0	0	0	
Annual Totals	0	0	0	0	0	0	0		0	0	0	0	0	N/A
Annual Event Average							0							

- NM means not measured; NA means calculation not available; N/A means not applicable

Appendix 2 (A2) – Carkeek CSO Plant Annual Report

This document constitutes the sixth annual report of the Carkeek plant as a CSO facility and summarizes its performance and operation during the period of June 2000- May 2001. The plant was placed into CSO operation November 1, 1994, under Carkeek's then existing wastewater treatment plant permit. The annual reporting period was modified October 25, 1999 to a schedule concurrent with annual CSO reporting period, June 1- May 31.

Performance

The Carkeek CSO facility operates under the Washington State Department of Ecology permit number WA-0029181-1 issued to the West Point treatment plant. As of July 1, 1998, the Carkeek effluent limits are defined as follows:

- discharge of suspended solids (TSS) is limited to a yearly average of events of 60 mg/l or less
- settleable solids (SS) will be limited to 1.9 or less ml/l/hr per event
- settleable solids (SS) will be limited to a yearly average of 0.3 or less ml/l/hr.

During the permit cycle, the number of events per year is limited to an average of 8 and flow is limited to an average of 14 million gallons per year, averaged over 5 years.

During the past year, there was one CSO discharge event on October 20, 2000 for 0.11MG. The sampler failed to operate during this one event, so SS and TSS concentration and removal are not known. While there is no indication that limits were exceeded, we have no data to document performance. This is considered the allowed one "poorly treated" event per year for measurement of treatment performance. Thus there were no discharges subject to the permit limits; therefore no permit violations occurred.

A summary of plant performance is shown on attached spreadsheet.

Operation

The sixth year of operation was the driest to date, with the lowest annual total discharge since facility began operating as a CSO treatment plant. (0.11 MG)

Maintenance modified the programmable logic control in the pump station, enabling three pumps to run and to transfer a maximum combined output of 8.4 MGD to West Point, September 2000.

Following King County's request, Chung Yee from Washington Department of Ecology approved the use of an online pH analyzer for monitoring and reporting the effluent at Carkeek prior to a permit modification.

On December 2000, the City of Seattle completed their new sewer tie into the influent structure at the pump station. These changes are sending additional flow through the facility and are included in the analysis recently performed for the Carkeek Overflow Reduction Study (Section 1.3.2.3).

There were two discharges, not resulting from precipitation, from the facility, on February 16, and April 1, due to power outages. They were not reported as a CSOs in the Discharge Monitoring Reports, but were reported as treated SSOs by letter to Laura Fricke of Ecology.

On April 5th, 2001, the electricians installed a plug-in at the Pump Station for an alternative power source. With the plug, a 250 kilowatt portable generator can be connected at the plant more quickly than previously, which would supply enough power to run one pump set at a rate of 4.3 million gallons per day if conventional power is not available to the station.

A permanent emergency generator, that will backup power to the pump station, is scheduled to be on-line in April 2002.

Following is a summary of Carkeek's performance during this period:

- One CSO discharge event occurred on October 20, 2000 of 0.11 MG.
- TSS data was not available for the October 20th discharge event because of a sampler malfunction. However, since one event each year can be dropped from the annual calculation, this event's TSS data does not figure in any compliance calculations.
- TSS removals were likely excellent due to the high percentage of capture and transfer to West Point

Figure A2-1 Carkeek Settleable Solids (SS) Performance

June 1, 2000 through May 31, 2001

Date	Discharge Event Number	Settleable Solids (mls/L/hr)	Event Maximum (ml/L/hr)	Event Average (ml/L/hr)
Oct-20	1	NM	NM	NA
Annual Event Average				NA

Details on the above information is provided below:

- <0.1 is detection limit; bold type indicates value used for the day in the event (highest when multiple tests are run during the day).
- Calculation of average settleable solids values uses 0.0 when value is < 0.1.
- Event average = average of daily values during an event.
- Annual event average = average of all event averages during the reporting year
- Flow data is reported daily from 00:00 hours to 23:59 hours.
- Sample data is taken from 00:00 hours to 23:59 hours.
- NM means not measured; NA means calculation not available

Figure A2-2 Carkeek Total Suspended Solids (TSS) Performance

June 1, 2000 - May 31, 2001

Date	Inflow Event Number	Influent Flow (MG)	Influent TSS (mg/L)	Discharge Event Number	Effluent Flow (MG)	Effluent TSS (mg/L)	Discharge Event Effluent TSS (mg/L)	WP TSS removal (%)	Influent TSS lbs of solids	Carkeek TSS lbs discharged -outfall	Solids pumped to WP (TSS lbs)	Carkeek solids (lbs TSS) treated out with WP effluent
09-Oct	1	0.06	772					0.90	386.3	0.0	386.3	38.6
19-Oct	2	0.02	140					0.91	23.4	0.0	23.4	2.1
20-Oct	2	0.4	156	1	0.11	NM	NA	87	520.4	NA	NA	NA
04-Nov	3	0.06	231					0.97	115.6	0.0	115.6	3.5
08-Nov	4	0.01	83					0.89	6.9	0.0	6.9	0.8
26-Nov	5	0.15	56					0.92	70.1	0.0	70.1	5.6
14-Dec	6	0.08	164					0.94	109.4	0.0	109.4	6.6
04-Jan	7	0.33	111					0.85	305.5	0.0	305.5	45.8
17-Apr	8	0.02	564					0.96	94.1	0.0	94.1	3.8
15-May	9	0.03	347					0.87	86.8	0.0	86.8	11.3
28-May	10	0.01	32					0.95	2.7	0.0	2.7	0.1
Annual Totals		1.17		1	0.11	NM	NA		1721.1	0.00	1200.71	118.14
Annual Average		0.1	250.0		0.11	NM	NA		120.1	0.0	120.1	11.8

Details on the above information is provided below:

- Flow data is reported daily from 00:00 hours to 23:59 hours.
- Sample data is taken from 00:00 hours to 23:59 hours.
- Carkeek influent poundage calculation: lbs = (volume in Million Gallons) x (concentration) x 8.34
- Transfer pounds out = Carkeek lbs. out + (Carkeek lbs in-Carkeek lbs out) x (1-WP TSS removal)
- Total Solids Out (Carkeek+West Point) = (Carkeek pounds out) + (transfer pounds out with WP effluent),
- Event Effluent Concentration = (total event pounds)/total event volume x 8.34)
- Annual Effluent Concentration = (sum of event concentrations)/number of events.